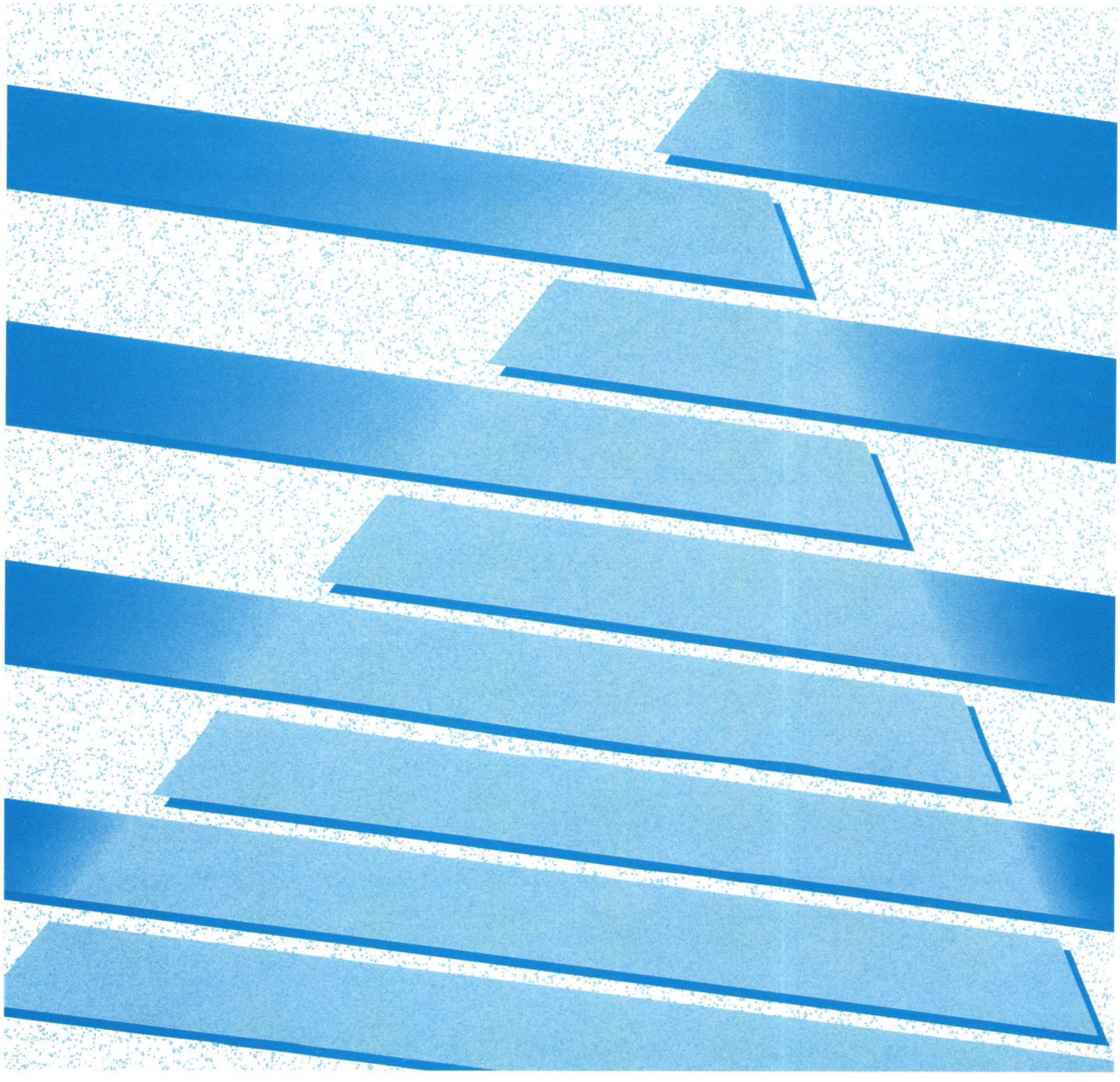
ALLEN-BRADLEY

ControlView™
A-B Drivers
(Cat. No. 6190-ABD)

User Manual



Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, the Allen-Bradley Company, Inc. does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley Publication SGI-1.1, "Safety Guidelines for the Application, Installation and Maintenance of Solid State Control" (available from your local Allen-Bradley office) describes some important differences between solid-state equipment and electromechanical devices which should be taken into consideration when applying products such as those described in this publication.

Throughout this manual we use notes to make you aware of safety considerations:

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss.

Attentions help you:

- identify a hazard
- avoid the hazard
- recognize the consequences

Important: Identifies information that is especially important for successful application and understanding of the product.

Summary of Changes

Changes from Release 2.0 to 3.0

The following changes have been made to the A-B Drivers option and the A-B Drivers User Manual since release 2.0:

For information on this new feature:	Refer to:	The feature appeared in:
Installation instructions for the A-B Drivers option have been moved to the *ControlView Installation Manual.*	ControlView Installation Manual	software release 3.0
String tags	Chapter 2	software release 3.0
1784-KT/KT2 offlink addressing via 1785-KA bridge	Chapter 2	software release 2.12
CRC error protocol supported	Chapter 1	software release 2.11
SLC-500 family supported on DH-485 via DH-485 Communication Interface and KF3	Chapters 1 & 2	software release 2.11
A-B RS-485 Data Highway supported (Cat. No. DH-485)	Chapters 1, 2 & 3	software release 2.11
PLC-5/40 and PLC-5/60 supported in native mode addressing	Chapter 2	software release 2.11
PLC-5/250 supported in native mode addressing	Chapter 2	software release 2.1
Structure Tags	Chapter 2	software release 2.1

Preface

How To Use This Manual

This manual describes the features and capabilities of the A-B Drivers option, which is a component of the ControlView™ system. The A-B Drivers software allows ControlView to communicate with Programmable Controllers (PLC™s) over the Data Highway, Data Highway Plus, Data Highway II or DH-485.

The manual describes:

- configuring ControlView for use with A-B Drivers
- connecting the Data Highway, Data Highway Plus, Data Highway II and DH-485 to ControlView
- running highway diagnostics
- using the ControlView commands specific to the A-B Drivers

Conventions Used in This Manual

This manual follows the print conventions in the *ControlView Core User Manual*.

Audience

The A-B Drivers software is a part of ControlView, therefore you should be familiar with ControlView and have the *ControlView Core User Manual* available for reference. A complete list of related publications is contained in that manual.

As well, you should be familiar with Allen-Bradley PLCs (PLC-2, PLC-3, PLC-5 and SLC 500 families) and Allen-Bradley networks (the Data Highway, Data Highway Plus, Data Highway II and DH-485). Consult the Industrial Computer Division Publication Index (SD 499) for more information about PLCs or communication modules.

Table of Contents

Chapter 1

Introduction

This manual shows you how to use release 3.0 of the A-B Drivers. You'll find instructions for:

- optimizing Data Highway communications
- configuring ControlView
- using ControlView's SET, RAMP, and STATUS commands for diagnostics
- understanding communication errors
- building the necessary cables

Supported Links and Data Channels

The A-B Drivers can be used with the:

- Data Highway *via* the serial port or 6171-IDH
- Data Highway Plus *via* the serial port or 6171-IDH
- Data Highway Plus *via* the KT or KT2 board
- Remote Data Highway Plus *via* the 1785-KA bridge
- Data Highway II *via* the serial port
- DH-485 *via* the 1770-KF3

ControlView supports these links to the Data Highways and PLC controllers:

Table 1.A
Supported Links to Data Highways and PLC Controllers

Network Link:	To:	Through:
Data Highway	PLC-2, PLC-3, PLC-5/11, PLC-5/20, PLC-5/30, PLC-5/40, PLC-5/60, PLC-5/250	6171-IDH, 1771-KC/KD, KE/KF, 1770-KF2 Series A or B
Data Highway II	PLC-2, PLC-3, PLC-5, PLC-5/250, PLC-5/11, PLC-5/20, PLC-5/30, PLC-5/40, PLC-5/60	1779-KFL/KFLR, KP2, KP3, KP5
Data Highway Plus	PLC-5, PLC-5/11, PLC-5/20, PLC-5/250, PLC-5/30, PLC-5/40, PLC-5/60	6171-IDH, 6171-QID, 1770-KF2 Series B, 1784-KT/KT2, 1785-KE, 1785-KA
DH-485	SLC 500 family	1770-KF3
direct serial link	PLC-3	1775-KA modem port
direct serial link	PLC-2	1771-KG
direct serial link	PLC-5/250, PLC-5/40, PLC-5/60	RS-232 port

Refer to the appropriate User Manual for details on how to connect a Data Highway to your computer.

Optimizing Data Highway Communications

For fast response from the Data Highway, you must make sure that your network is set up for maximum efficiency. The suggestions in this section can help you improve the efficiency of your network.

Packets

ControlView scanners combine read requests into packets to communicate with the PLC controllers on a highway.

Packets are formed for each scan class in the following way:

- One packet for every Node being accessed. Multiple Nodes may point to the same PLC controller, but ControlView treats them as separate PLC controllers. ControlView allows you to identify 256 Nodes. For optimum performance, you should stay far below this number.
- One packet for every file within a PLC controller being accessed.
- One packet for each block of data requested of up to 110 words long. Try to keep the programmable controller points you are scanning in tight blocks within the controller memory. ControlView sorts your read requests to minimize the number of Data Highway packets. You can help by packing the data in the programmable controller so a minimum of blocks will be read.

Important: When ControlView forms packets to read values from a SLC, it requests up to 110 words per packet. However, the current SLC can only process a read request of 41 words or less. If ControlView requests more than 41 words, the SLC will return an error code, and the following communication error will be logged to the Activity log (if it is configured to log COMM errors):

```
0010 Illegal Command or Format
```

To ensure that ControlView does not request a read of more than 41 words per packet, place tags on a new node, (pointing to the same SLC), every contiguous 41 word block. Since ControlView forms a different packet for different file types, you can share the same node with different file types.

Table 1.B
Examples of Node Formation for SLC

First Node	Second Node	
O:x.0 to O:x.40	O:x.41 to O:x.81	x = I/O Slot Number
I:x.0 to I:x.40	I:x.41 to I:x.81	x = I/O Slot Number
Bn:0 to Bn:40	Bn:41 to Bn:81	n = File Number
Nn:0 to Nn:40	Nn:41 to Nn:81	n = File Number
Tn:0 to Tn:12	Tn:13 to Tn:25	n = File Number
Cn:0 to Cn:12	Cn:13 to Cn:25	n = File Number
Rn:0 to Rn:12	Rn:13 to Rn:25	n = File Number

- If within a PLC file the two requested PLC addresses are over 55 words apart on a Data Highway or Data Highway Plus, or 41 words on DH-485, ControlView will request two small packets instead of one large one.

Due to the architecture and bandwidth of the Data Highway, it is advisable to keep the number of Data Highway packets being scanned as low as possible. ControlView can scan a maximum of 64 packets per scan class at a time, but the practical limit to ensure adequate Data Highway response time performance is about 25 packets per scan class. Use of the KT Adaptor may eliminate this bottleneck.

ControlView will display an error message when you load a database that produces over 64 packets.

Lowering the Number of Packets On Scan

To decrease the number of packets on scan, use these guidelines.

- Have ControlView collect all data from a few large PLC files. This is the most effective method of decreasing the number of packets on scan. You can use ladder logic moves and block transfers to centralize all the necessary information into a contiguous block within a single file. It is far more efficient for ControlView to scan tightly grouped points than to request 10 or 15 pieces of information from several PLC files.

Important: A single packet on a Data Highway or Data Highway Plus can contain 1760 digital points, or 110 analog values (55 if they are long or float type). A single packet on a DH-485 can contain 1312 digital points, or 82 analog values (41 if they are long or float type).

- Use a "Data Concentrator" PLC controller to collect all of the information from the other PLC controllers into one place using "message" ladder instructions, then have ControlView read only that PLC controller.

  This works especially well with a PLC-3 as the concentrator, because two separate highways can have access to the PLC-3 data tables, ControlView on one port, and all the other PLC controllers on the other.

- Scan as few points as possible. Up to 2,000 points can be placed in each of the eight (A–H) scan classes, to a maximum of 10,000 points. Up to 400 tags can be in the string tag scan classes (S1–S3) to a maximum of 1,000 string tags. The guideline is: the fewer points on scan, the better. Remember, too, that it is more efficient to scan tightly grouped points than widely distributed ones.

- ControlView will put a tag on scan for any of the following three reasons:

  - If a background application (such as Alarming, Data Logger, or Event Detector) needs the tag's value, the tag will be scanned at the background rate specified by its scan class.

  - If a foreground application (such as a Mouse GRAFIX™ display, or Trending display) needs the tag's value, the tag will be scanned at the foreground rate specified by its scan class.

  - A C-Toolkit task starts scanning a point.

Multiple Highway Connections

The serial link between ControlView and the communication module often creates a bottleneck in communications. The maximum baud rate allowed is 19200 baud. Using two separate Data Highways, or even two communication modules connected to the same highway will sometimes help the performance in heavily loaded situations.

Different Data Highway Systems

In installations with multiple ControlView Systems, remember that each system could be scanning its points quite often. The Data Highway handles this quite well, but in heavily loaded situations, it may be best to use separate highways or direct serial connections.

ControlView supports Data Highway, Data Highway Plus (PCL), and Data Highway II native mode addressing.

Error-Detection Protocol

A-B Drivers supports the CRC (Cyclic Redundancy Check) error-detection protocol as well as the BCC (Block Check Character) protocol. Only the DF1 and DHII drivers can take advantage of CRC error checking.

CRC is a more complex form of error detection, and yields a higher level of data security than BCC. On the other hand, because of its greater complexity, CRC is a more time-consuming process than BCC. If you are installing the A-B Drivers in an existing facility, your choice of error-detection protocol will probably be dictated largely by existing equipment and standards in the plant. If this is a new installation, you must make the choice.

For more information on error-checking protocols, see the *Allen-Bradley Communication Interface Module User's Manual* (Cat. No. 1770-KF2), Chapter 4, *Asynchronous Link Protocols*.

By default ControlView uses BCC; to set CRC error-checking, you have to set an environment variable in DOS before running ControlView. The environment variable is CV_CRC_HW#, where # refers to one of the two possible data highways.

To set highway 1 to use CRC checking, at the DOS prompt, set the environment variable as follows:

```
SET CV_CRC_HW1=ON
```

Set Highway1 back to BCC error checking as follows:

```
SET CV_CRC_HW1=
```

To configure CRC error-checking automatically every time you boot your computer, add the SET command to your AUTOEXEC.BAT file.

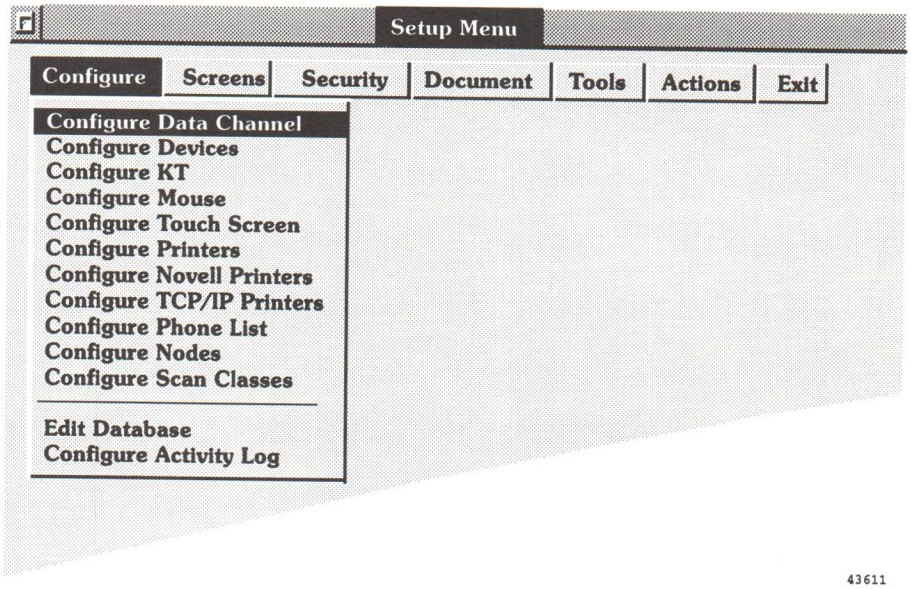
Chapter 2

Configuring the A-B Drivers

When you start up ControlView, the first menu to appear is the Setup Menu. Use the Setup Menu to configure the A-B Drivers.

Important: The Setup Menu appears in the default ControlView system. If you have modified ControlView so that the Setup Menu does not appear, open the configuration windows from the command line.

Figure 2.1
The Setup Menu



In the Configure menu, the items which involve driver configuration are:

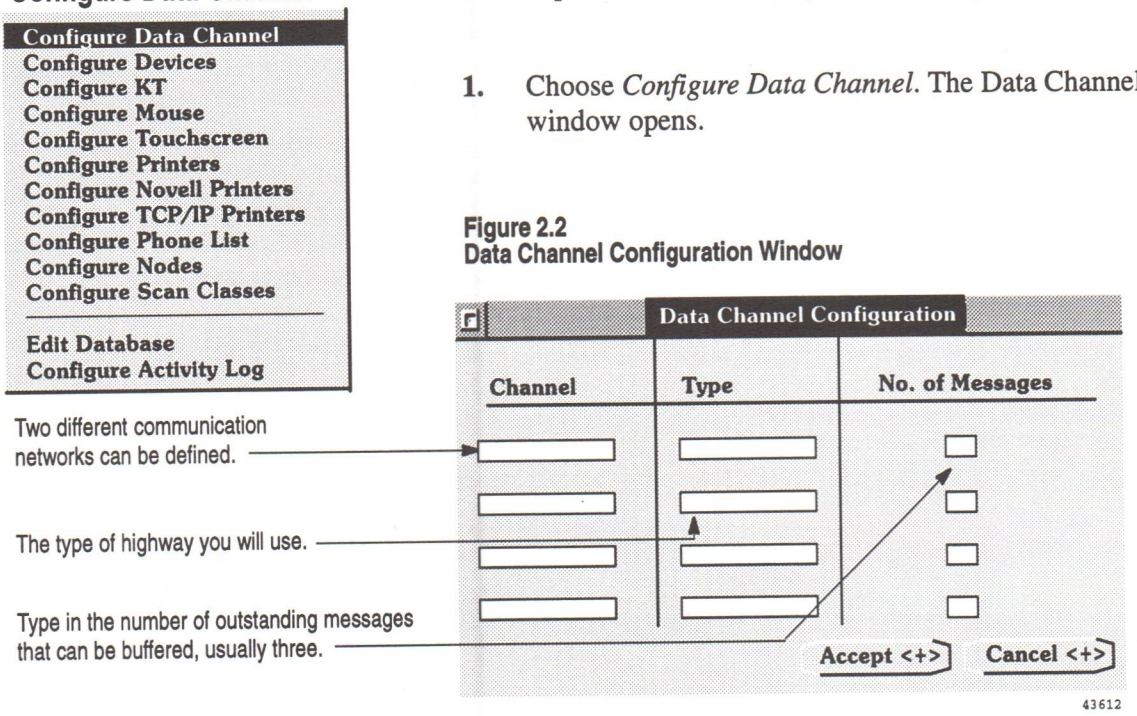
- Configure Data Channel
- Configure Devices
- Configure KT
- Configure Nodes
- Configure Scan Classes
- Edit Database

Configure Data Channel

To set up the data channel(s) you'll be using, follow these steps:

1. Choose *Configure Data Channel*. The Data Channel Configuration window opens.

Figure 2.2
Data Channel Configuration Window



2. For each data channel you are configuring, fill in these fields:

   - Channel

     The first *Data Channel* field will be highlighted. Press **Enter** to bring up a list of possible choices. Choose *Highway1* or *Highway2*.

   - Type

     The *Type* field specifies which driver ControlView will use. Choose one of:

     - DH/DH+
     - DH2
     - DH485

   - Number of Messages

     Enter a number between 1 and 4. For optimum Data Highway performance, set this field to *3*.

     This field specifies the number of Data Highway messages (transactions) that ControlView will send to a node before waiting for a response.

If a device's buffer should overflow, (most likely to occur with some revisions of PLC-3 1775-KA modules) you'll see a communication error in the Communication Status display, and in the Activity Log file (see Chapter 3, *Using the Drivers*). If this should happen, reduce the number of messages to 2 or 1.

3. When you're finished, choose *Accept* or press + to save the information and return to the menu.

Configure Devices

Once you've identified the *Channel*, *Type* and *No. of Messages* for each of the data channels, you must specify how it is attached to the computer: either through the serial port or the KT Adaptor. Do this through the Device Configuration window. The device settings in the Device Configuration window define the equipment connected to the serial and parallel ports.

The ports can be connected to several types of devices: data channels, printers, a mouse, networks and Control Panel keyboards. Details for configuring the data channels are provided in this manual; details for other serial devices and the printers are in the *ControlView Core User Manual.*

1. Choose *Configure Devices* from the Configure menu, and the Device Configuration window appears.

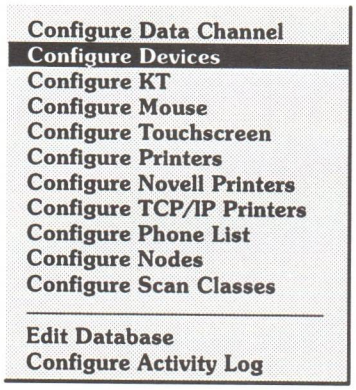
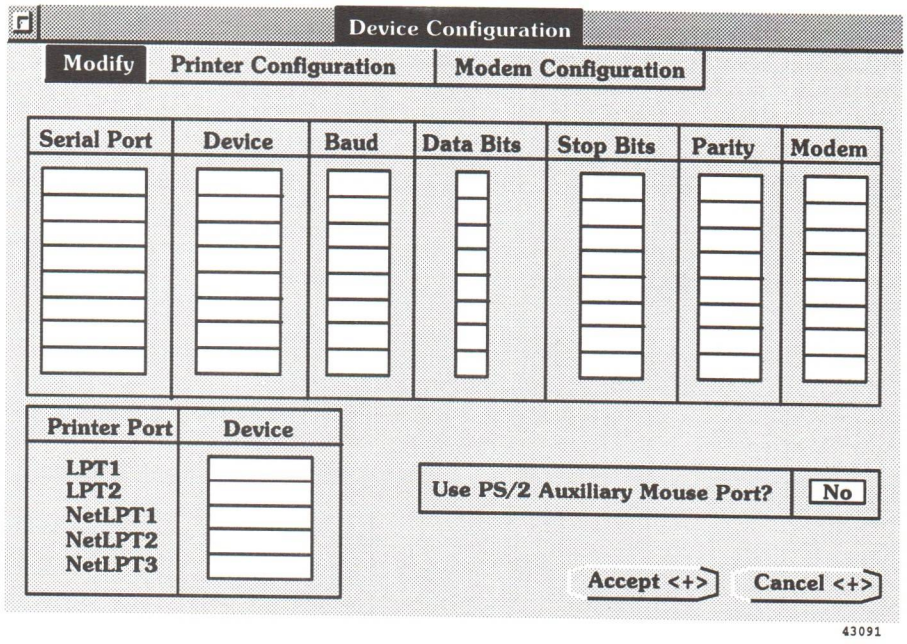


Figure 2.3
The Device Configuration Window



The standard IBM parallel ports, or the parallel port(s) on the 6171-MX5/8 expander.

The Novell network printer ports.

2. For each data channel attached to a serial port, enter the following information:

   - Serial Port

     Select a port to configure. Table 2.A lists the ports you can use.

Table 2.A
ControlView Serial Ports

Port	Supplied by:
IBMCOM1 OR IBMCOM2	IBM serial communication ports
IBMCOM3 through IBMCOM8	only on PS/2s
MXCOM1 through MXCOM4	6171-MX5 expansion serial ports
MXCOM1 through MXCOM6	6171-MX8 expansion serial ports

You can only use the MXCOM ports if you have a 6171-MX5/8 serial port expander.

   - Device

     Choose *HIGHWAY1* or *HIGHWAY2*. The specifics of these channels are already defined in *Data Channel Configuration.*

   - Baud Rate

     Choose *19200.*

     Some Allen-Bradley communication interface modules, such as the 1771-KC/KD's may only function at rates up to 9600 baud (refer to the module's documentation).

   - Data Bits

     Choose *8.*

   - Stop Bits

     Choose *1.*

   - Parity

     Choose *None.*

   - Modem

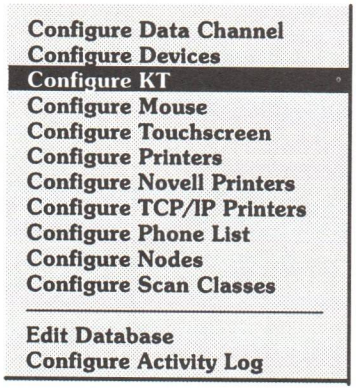
     Choose *None.*

3. Choose *Accept* to save the device configuration on disk. Then press **Esc** to close the Device Configuration window and return to the menu.

Configure KT

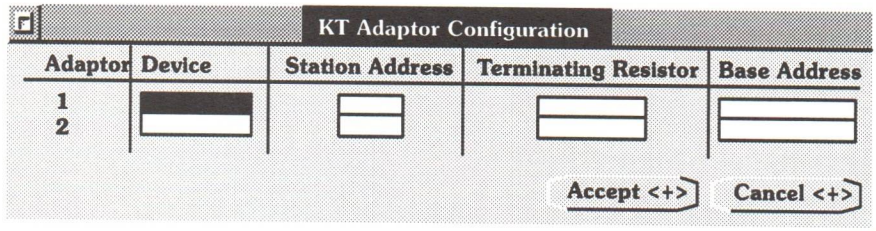
The Allen-Bradley 1784-KT and 1784-KT2 Processor Communications Interface Modules (referred to by ControlView as KT Adaptors) are optional plug-in cards that provide a communication link to a Data Highway Plus. There can be up to two KT/KT2 adaptors installed.

The A-B Drivers software now supports 1784-KT/KT2 offlink addressing. This means that a ControlView system equipped with a KT/KT2 adaptor can communicate with nodes on remote Data Highway Plus networks bridged by a 1785-KA (Revision E or later) Interface Module.



1. To configure ControlView to use a KT or KT2 Adaptor, choose *Configure KT*. The KT Adaptor Configuration window will open.

Figure 2.4
KT Adaptor Configuration Window



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2. Fill in these fields in the KT Adaptor Configuration window:

   - Device

     One of: *Highway1* or *Highway2*. The highway must already be defined in the Data Channel Configuration window.

   - Station Address

     An octal number from *0–77*.

   - Terminating Resistor

     Choose *Set* if your connection to the PLC controller is direct, i.e., one computer and one PLC controller. Choose *Reset* if you have a multi-drop network, i.e., more than one node on the link.

   - Base Address

Important: If you have two KT adaptors installed, the one with the lower memory address setting is always Adaptor 1. The second Adaptor setting, 2, is not available unless two KT/KT2 adaptors are present.

3. Before starting ControlView, set the switches on the board to one of the following addresses.

Table 2.B
KT Address Settings

If your computer has this configuration:	use one of these settings:
EGA® with an 80386 computer	C400:0000 C800:0000 * CC00:0000 D000:0000 D400:0000 D800:0000
VGA® with an 80386 computer	C800:0000 * CC00:0000 D000:0000 D400:0000 D800:0000

* indicates recommended setting

4. Then select the corresponding address in ControlView. The address set by the switches and the address in the Base Address field must be the same.

5. Set the jumper for the interrupt in the Unused position. See the *1784-KT User's Manual* for further details.

6. Click on the *Accept* button or press + to save the KT Adaptor Configuration to disk and return to the menu.

Restart ControlView to Initialize the Devices

For the changes you've made to take effect, you must restart ControlView. Choose *Quit to DOS* in the Exit menu, and then restart ControlView. (This does not have to be done at this point; you can finish your configuration first.)

Configure Nodes

Use the Node Configuration window to define each programmable controller connected to the data channels.

ControlView supports 1784-KT/KT2 offlink addressing. This means that a ControlView system equipped with a KT card can communicate with nodes on remote Data Highway Plus networks bridged by a 1785-KA (revision E or later) Interface Module.

Configure Data Channel
Configure Devices
Configure KT
Configure Mouse
Configure Touchscreen
Configure Printers
Configure Novell Printers
Configure TCP/IP Printers
Configure Phone List
Configure Nodes
Configure Scan Classes

Edit Database
Configure Activity Log

1. Choose *Configure Nodes* from the Configure menu, and the Node Configuration window appears.

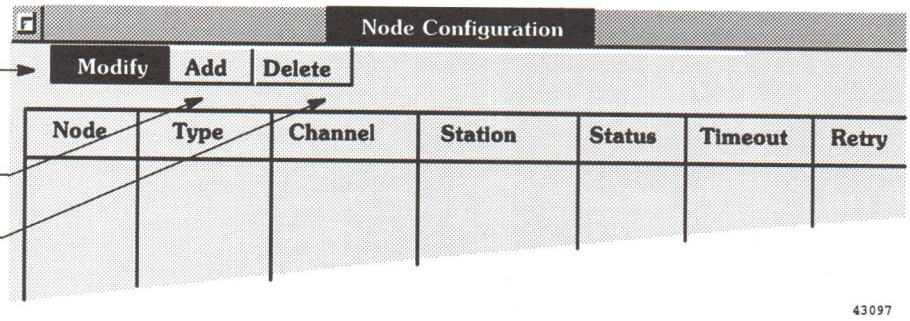
   In the Node Configuration window, each programmable controller that ControlView will communicate with is given a name and an associated configuration. The programmable controller is then referred to by that name. This means the attributes such as programmable controller type and station number, which network it's on, etc. needn't be repeated; the node name carries with it all that information.

Figure 2.5
Node Configuration Window

Select a node and choose *Modify*. You can then change any of the fields. Press + to save the changes, or **Esc** to abandon them.

Choose *Add* and an empty input window pops up. Fill in the fields and press + to save the information, or **Esc** to cancel the addition.

Select a node and choose *Delete*. Choose Accept, to confirm the deletion or **Esc** to cancel the deletion.



2. Enter the following information for each node you are configuring:

   - Node

     A name of your choice (up to 8 characters), to represent a programmable controller on the network. Up to 256 nodes can be defined.

   - Type

     The programmable controller family: *PLC-2, PLC-3, PLC-5, PLC-5/11, PLC-5/20, PLC-5/30, PLC-5-40/60, PLC-5/250, SLC500*. This determines the communication protocol.

   - Channel

     Choose *HIGHWAY1* or *HIGHWAY2*, whichever you defined in the Data Channel Configuration window).

   - Station

     The physical station number of the programmable controller on the data channel.

- For Data Highway and Data Highway Plus

  Specify the station number in octal. Valid station numbers are:

  - *0 – 376* (for Data Highway)
  - *0 – 77* (for Data Highway Plus)

- For the DH-485:

  Use the physical station number of the SLC 500 on the DH-485 network in decimal. Valid numbers are *0-31*.

- For the Data Highway II:

  Specify the Station, Link, and User numbers in the Station field. The format is:

  STATION.LINK.USER

  Valid entries are *0–377* (octal) for all three components.

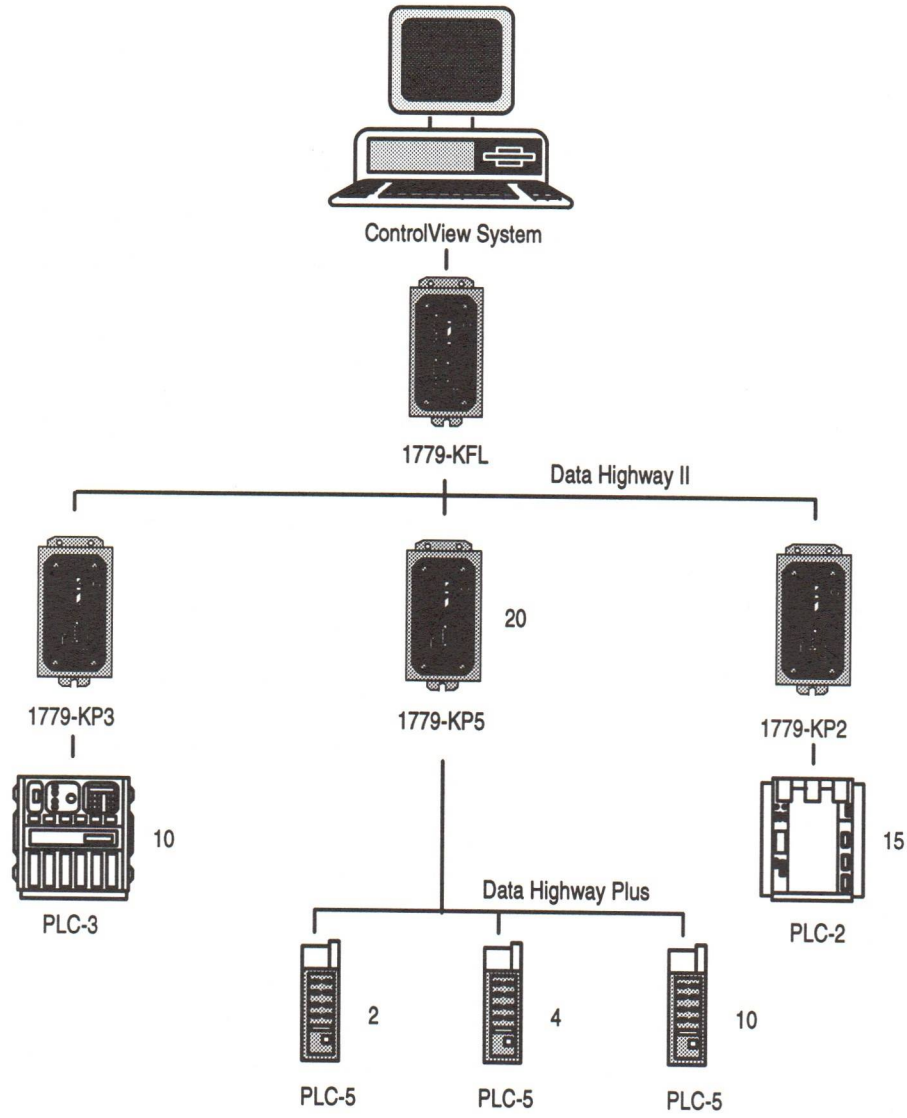
  - *STATION* is the station number of the programmable controller (determined by switches on the communications interface module connected to the controller).
  - *LINK* is the Link number, usually 0, unless you are bridging to a second Data Highway II.
  - *USER* is usually 1.

  Figure 2.6 shows an exception to this rule:

  To address the PLC-5s, which are bridged to the Data Highway II network through a 1779-KP5, set USER to each PLC-5's Data Highway Plus address.

  Note that you set the STATION number of these PLC controllers to the 1779-KP5's station number on the Data Highway II network, not to the PLC-5's station number on the Data Highway Plus.

Figure 2.6
The Station, Link, and User Numbers for the Data Highway II



- For KT Offlink addressing on a remote Data Highway Plus

To address a node on a remote Data Highway Plus, type in an address in this form:

ll.rrr.ss

ll	=	local bridge address	0-77 octal
rrr	=	remote bridge address	0-376 octal
ss	=	station on remote highway	0-77 octal

ControlView also allows you to shorten the offlink address by combining the bridge and station addresses into one three digit number. The system reads only the first digit of the bridge address, and adds the two digit station address to produce a shorter address that still points to the same node:

ll.rrr

ll	=	local bridge address	0-77 octal
rrr	=	combined remote bridge/remote highway station address	0-376 octal

Figure 2.7 shows a ControlView linked to a Data Highway Plus through a KT card. The Data Highway Plus is linked to a Data Highway, which in turn is linked to a second Data Highway Plus. The 1785-KA Interface Modules supply the bridges between the Data Highway and the two Data Highway Plus networks.

Important: ControlView does not support the routing feature available with Version A07 of the PLC-5/250 5130-RM and 5130-KA modules. Off-link routing of messages is only supported via the 1785-KA Interface Module, as illustrated in Figure 2.7.

Figure 2.7
Remote Addressing on the Data Highway Plus

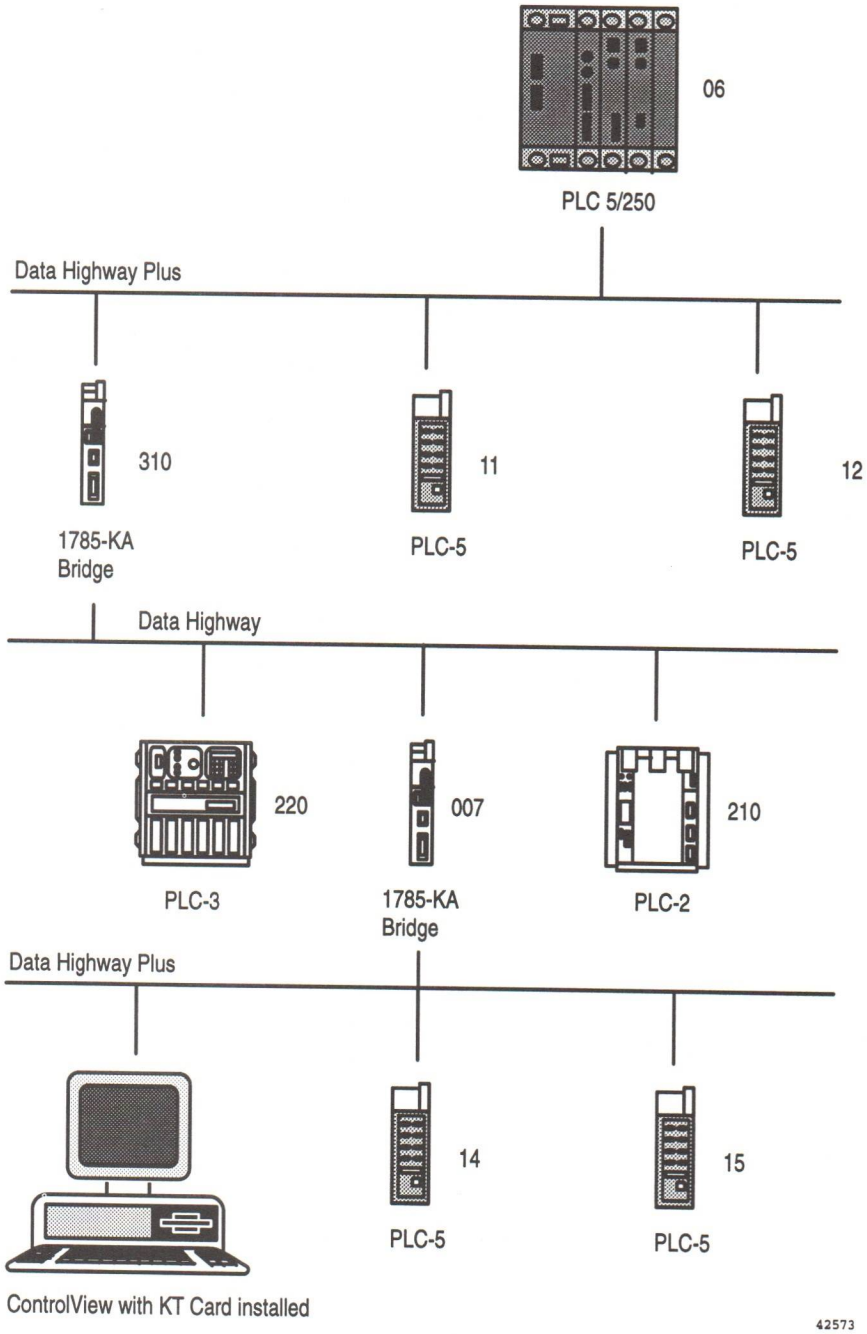


Table 2.C shows how ControlView would address various nodes on the highways in Figure 2.7:

- addressing nodes 14 and 15 requires an on-link address only, since no bridge is involved

- addressing nodes 210 and 220 on the Data Highway involves one bridge, so the address requires two levels

- addressing nodes 06, 11 and 12 on the remote Data Highway Plus requires the inclusion of the local bridge address, the remote bridge address and the remote node address. As stated, this can be done in two ways, with a two-level or a three-level address

Table 2.C
Remote Addresses

Node	Bridge	Remote Bridge	Station	3-level Address	2-level Address
14	None	None	14	None	None
15	None	None	15	None	None
210	007	None	210	None	7.210
220	007	None	220	None	7.220
06	007	310	06	7.310.06	7.306
11	007	310	11	7.310.11	7.311
12	007	310	12	7.310.12	7.312

- Status

Enabled or disabled. Normally nodes are enabled, allowing information to be collected. However, during setup or trouble shooting it may be necessary to disable a node to avoid communications timeouts or invalid data. When a node is disabled, tag read/writes use the Current Value Database (CVD); tag values can still be altered in the CVD with the Tag menu options, Set a Tag Value and Ramp Tag Value , and the SET and RAMP commands.

Note: Accessing direct PLC addresses when a node is disabled produces errors.

- Timeout

The time (0 to 65535 seconds) to wait before trying again, if there's a communications problem. 3 seconds is usually a good timeout setting.

- Retry

  The number of times to attempt to establish communications before giving up and reporting a communications error. 3 retries is normally sufficient.

Unload and Reload the Database to See Your Changes

If a database was loaded when you started editing the nodes, the changes will not take effect until you unload the database and load it again.

Configure Scan Classes

To "scan" is to read the value found at a programmable controller address. The scan *period* is how often the address is scanned. ControlView has eleven scan classes, each of which has its own foreground and background scanning period.

The values you enter in the Foreground and Background Period fields of the Scan Class Configuration window set how many seconds elapse between scans. A setting of 1 scans programmable controller addresses once every second. The longest period is 99,999 seconds—just over 28 hours. A setting of 0 seconds means no wait time—the scan will be performed as often as the highway can provide the information.

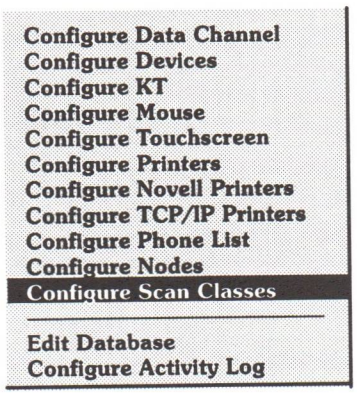
Important: Use the 0 setting with caution, since the performance of background tasks such as Alarming can be compromised when the foreground task tries to scan at top speed.

When defining the scan periods, keep in mind that any tag value in the database is only as accurate as the last scan. If scanning is too slow, the information isn't current. If all scanners are set to high speed scan, network traffic may increase to the point where system performance suffers. The concept of scan classes allows you to optimize your system's performance – to provide high-speed scanning where it's required, and to save on system resources by using lower scan period wherever it's acceptable.

The scan classes for analog and digital tags have letter names, A through H. There is no priority in these names – any of them can have any scan period.

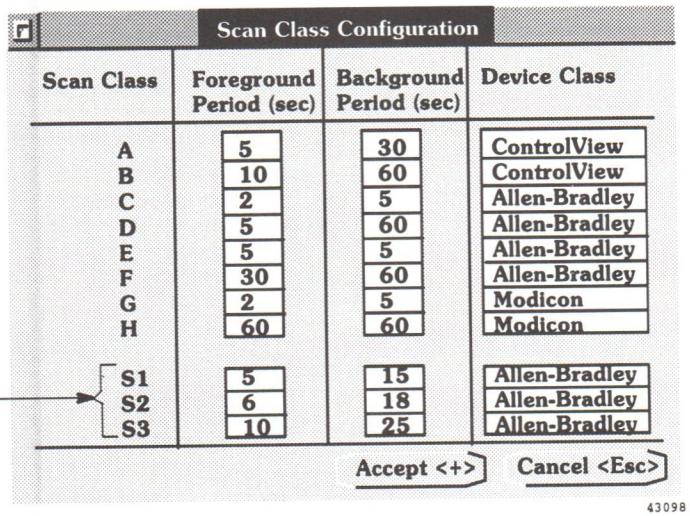
If you have string tags in your database, use scan classes S1, S2 and S3 to configure scan rates for them. String tags cannot be included in scan classes A-H, and analog and digital tags cannot be included in scan classes S1-S3.

Follow these steps to configure the scan classes:



1. Choose *Configure Scan Classes* from the Configuration menu and the Scan Class Configuration window appears.

Figure 2.8
The Scan Class Configuration Window



2. Fill in the following fields to set up the scanners:

   - Foreground Period

     Choose a rate for applications running in the foreground, such as Mouse GRAFIX screens or Trend graphs.

   - Background Period

     Choose a rate for applications running in the background, such as Alarming, Event Detector and Derived Tags.

   - Device Class

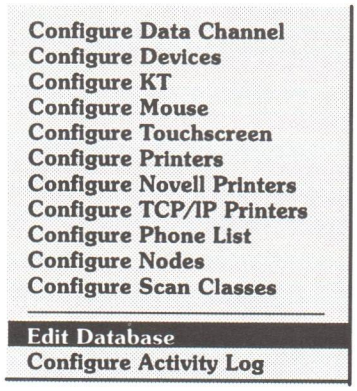
     Choose *Allen-Bradley* from the list.

3. Click on the *Accept* button or press + to save the information in the Scan Class Configuration window to disk, and to return to the Setup Menu.

Unload and Reload the Database to See Your Changes

If a database was loaded when you changed the scan classes, you will not see the changes until you unload the database and load it again.

The Database and Addressing



To add a point in the database:

1. Choose *Edit Database* from the Configure menu.
2. Choose a database.
3. Choose *Add* from the Configure Database window.
4. Specify a tag type.
5. Enter a properly formatted address in the Configure Digital Point window (Figure 2.9), the Configure Analog Point window (Figure 2.10), the Configure String Tag window (Figure 2.11), or the Configure Structure window (Figure 2.12). For Structure tags, this is a base address.

Figure 2.9
The Configure Digital Point Window

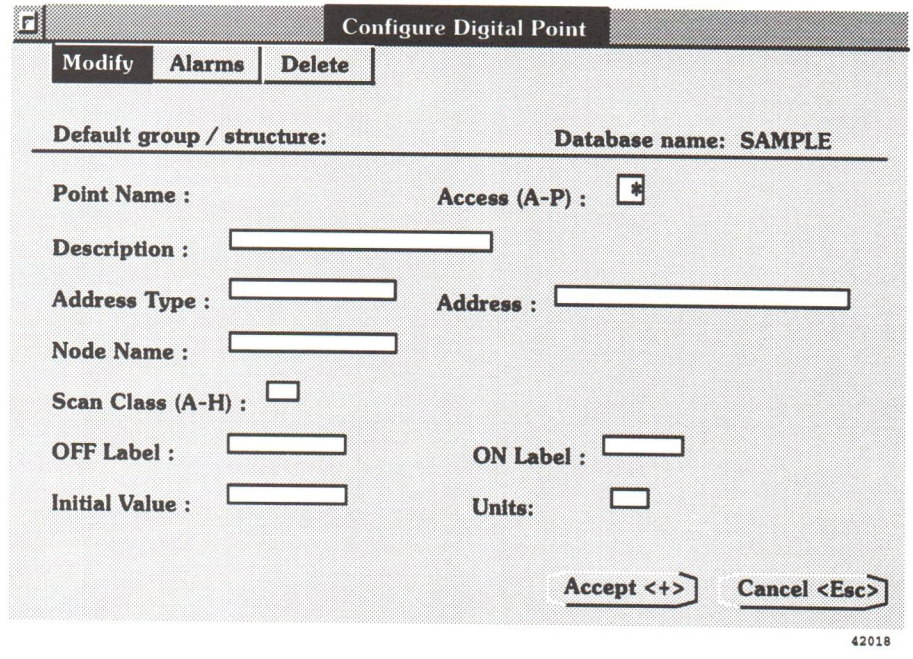


Figure 2.10
The Configure Analog Point Window

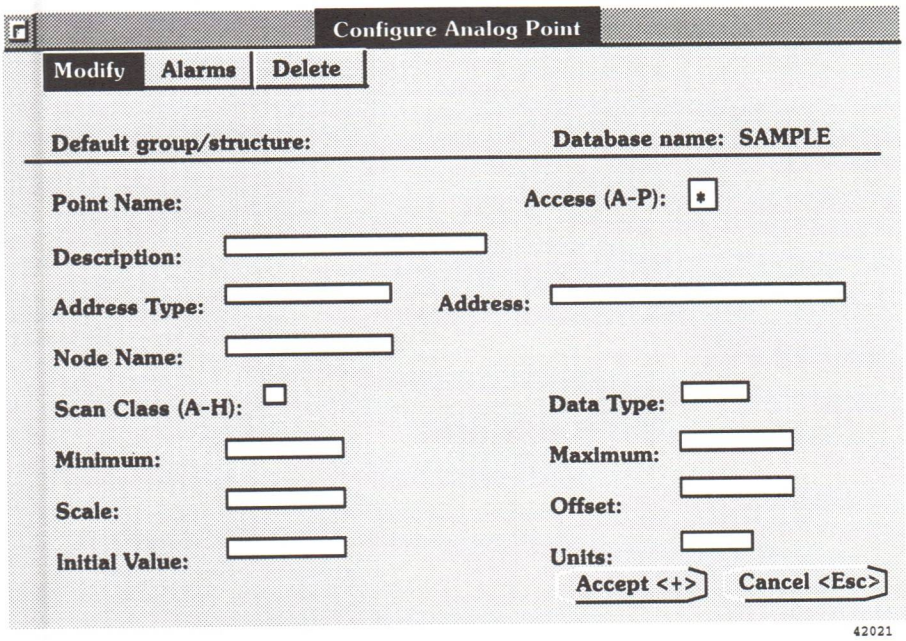


Figure 2.11
The Configure String Tag Window

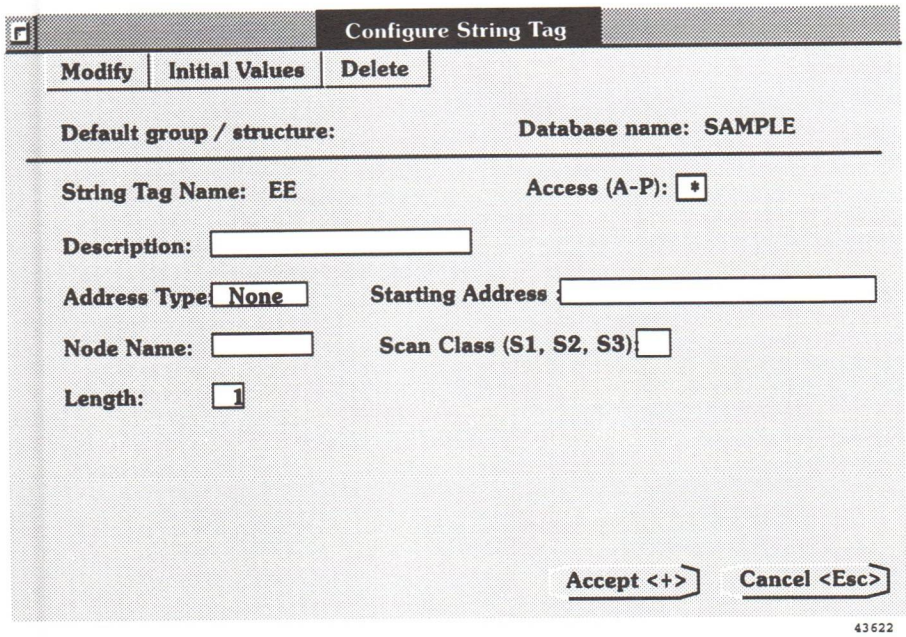
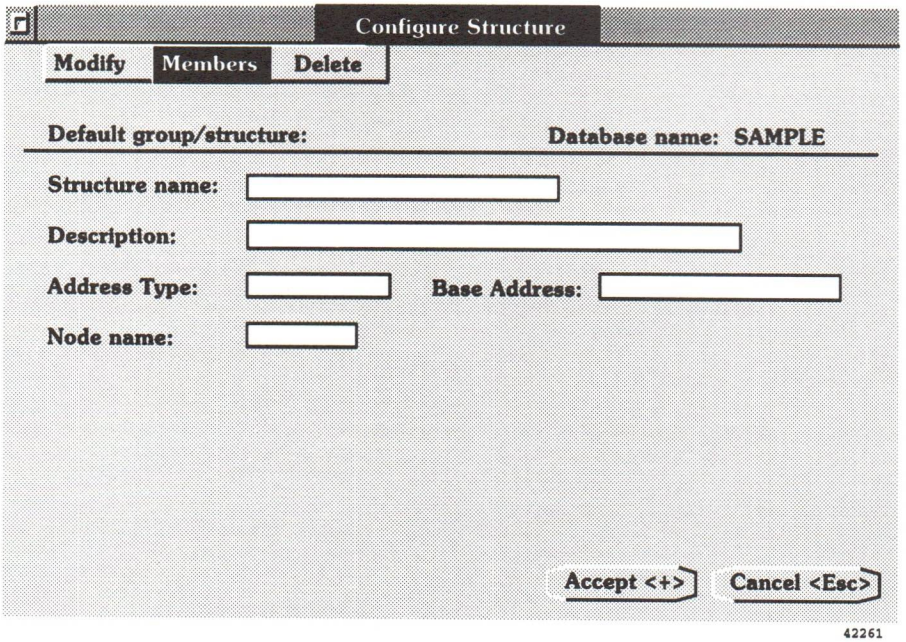


Figure 2.12
The Configure Structure Window



Chapter 3, *The Setup Menu*, in the *ControlView Core User Manual* describes configuration for most of the fields in these windows. Two fields, *Address Type* and *(Base) Address*, vary with the network and the corresponding driver software you are using.

- Address Type

  Choose *PLC-2, PLC-3, PLC-5, PLC-5/40/60, PLC-5/250, SLC 500, PLC-5/11, PLC 5/20*, or *PLC 5/30* depending on which PLC family this tag is addressing. For local tags, choose *None*.

- Address/Base Address

  Specify the exact memory location in the PLC controller, following the correct syntax for the PLC controller.

Addressing Syntax for PLC Controllers

PLC-2 Addressing Syntax

aaaa/bb

aaaa = address (octal) 0-7777
bb = (optional) Bit Offset within word (octal) 0-17

Valid Example: 11/17

PLC-3 and PLC-5 Data and I/O files

Fnnn:aaa/bb

F = File type:
B = binary
N = integer
D = decimal
O = output
I = input
F = floating point
S = status
H = high order integer
(PLC3 only: the CVD uses single precision float, so the value is approximate)

nnn = File number: 0-999

aaa = Word address
octal for I/O files; 0-777
decimal for all others; 0-999

bb = Bit offset within word (optional):
octal for all PLC-3 files, and for PLC-5 I/O files: 0-17
decimal for all other PLC-5 file types: 0-15

Valid Example: D463:173/15

PLC-5 Data and I/O files: Optional Syntax

Fnnn/bbbbb

F = File type:
B = binary
N = integer
D = decimal
F = floating point
I = input
O = output
S = status

nnn = File number 0-999

bbbbb = Bit offset from start of file (decimal): 0-99999

Valid Example: B231/32761

PLC-3 Timers and Counters,

FWWW:nnnn/bb

F = File type: C = Counter
T = Timer

WWW = Structured word:
CTL = control word
PRE = preset value
ACC = accumulated value

nnnn = Counter/Timer number (decimal): 0-9999

bb = Bit Offset within Word (octal):
/15 = done bit
/16 = timing bit
/17 = enable bit

Valid Example: CPRE:7125/17

PLC-5 Timers and Counters

Fnnn:ccc.MNE/bb

F = File type: C = Counter
T = Timer

nnn = File number: 0–999

ccc = Counter/Timer number: 0–999

MNE = Structure mnemonic:
PRE = preset value (word)
ACC = accumulated value (word)
EN = timer enable bit (15)
CU = counter up bit (15)
TT = timer timing bit (14)
CD = counter down bit (14)
DN = counter/timer done bit (13)
OV = counter overflow bit (12)
UN = counter underflow bit (11)

bb = Bit offset within word (decimal):
(Use the bit offset only with the word mnemonics PRE or ACC.)

Valid Example: T357:291.ACC/13

PLC-5/250:Numeric Data On The Resource Manager & Logic Processor Modules

MSnnn:eeee/bb

M = Module number:
0 = Resource Manager
1-4 = Logic Processor
Thumbwheel Setting

S = Section:
B = Binary
N = Integer
L = Long Integer
F = Floating Point
ST = String

nnnn = File number (decimal): 0-9999
eeee = Element number (decimal): 0-9999
bb = (optional) Bit number (decimal): 0-15

Valid Example: 3N722:4685/12

PLC-5/250: Structured Data on the Resource Manager & Logic Processor Modules

MSnnn:eeee.MNE[ss]/bb

M = Module number:
0 = Resource Manager
1-4 Logic Processor
Thumbwheel Setting

S = Section:
T = Timer
C = Counter
R = Control
PD = PID Control
MSG = Message Control

nnn = File number (decimal): 0-9999
eeee = Element number (decimal): 0-9999
MNE = Member Mnemonic (refer to Tables 2D–2H)
ss = Submember: Only applies to .ADDR and .DATA members of PID structure and .DATA member of MSG structure
bb = (optional) Bit number (decimal): 0-15

Valid Example: 3PD192:4685.DATA[0]/11

PLC-5/250: Data Stored In The System Public Status Section

MS:eee/bb

M = Module number:
0 = Resource Manager
1-4 Logic Processor
Thumbwheel Setting

S = Section: S = Status

eeee = Element number (decimal): 0-314

bb = (optional) Bit number (decimal): 0-15

Valid Example: 2S:314/14

PLC-5/250: Addressing Input/Output Image Files

S:rrg/bb

S = Section: I = Inputs
O = Outputs

rr = Rack number (octal):
00-07 Remote Scanner 1
10-17 Remote Scanner 2
20-27 Remote Scanner 3
30-37 Remote Scanner 4

g = I/O group number (octal): 0–7

bb = (optional) Terminal or Bit number (octal):
00-17

Valid Example: I:236/07

PLC-5/250: Addressing Internal Storage Areas of Remote Scanner Modules

IS:eee/bb

IS = Internal Storage section

eee = Element number (octal):
000-177 Remote Scanner 1
200-377 Remote Scanner 2
400-577 Remote Scanner 3
600-777 Remote Scanner 4

bb = (optional) Bit number (octal): 0-17

Valid Example: IS:267/12

PLC-5/250: Addressing Adapter Status Areas of Remote Scanner Modules

ASrr:q.MN

AS = Adapter Status section
rr = Rack Number (octal):
00-07 Remote Scanner 1
10-17 Remote Scanner 2
20-27 Remote Scanner 3
30-37 Remote Scanner 4
q = Rack Quarter number (decimal): 0-3
MN = Mnemonic: OI = Output Inhibit
CF = Fault
RC = Retry Count

Valid Example: AS37:2.RC

PLC-5/250: Shared Memory in the CVIM Module

pSDiiii:wwww/bb

p = Pushwheel number (decimal): 1-4
SD = Shared Data identifier
iiii = CVIM identifier (decimal): 0-9999
wwww = Word number (decimal): 0-1023
bb = (optional) Bit number (decimal): 0-15

Valid Example: 4SD2983:742/15

PLC-5/250: Block Transfer Data Section

rBTDnnn:eee/bb

r = Remote Scanner number (decimal): 1-4
BTD = Block Transfer Data section
nnn = File number (decimal): 0-254
eee = Element number (decimal): 0-254
bb = (optional) Bit number (decimal): 0-15

Valid Example: 3BTD127:222/7

PLC-5/250: Block Transfer Control

SSrr:sMNE/b

SS = Section: BR = Block Read
BW = Block Write
rr = Rack number (octal): 0-37
s = Slot number: 0-1
MNE = Mnemonic: (see Table 2.I)
b = (optional) Bit Offset: 0-7

Valid Example: BR267:0.IDX/5

PLC5-40/60 I/O and Status Files

F:aaa/bb

- *F* = File type: I = Input, O = Output, S = Status
- *aaa* = Word address:
  - in octal for input and output files
    - PLC-5/40 – 0-200 octal
    - PLC-5/60 – 0-277 octal
  - in decimal for status files
    - 0-127 decimal
- *bb* = (optional) Bit Offset within Word:
  - in octal for input and output files
    - 0-17 octal
  - in decimal for status files
    - 0-15 decimal

Valid Example: O:167/11

PLC5-40/60 Binary, Integer, BCD, Float and String Files

Fnnn:aaa/bb

- *F* = File type: B= binary, D =decimal, N = integer, F = floating point, ST = String
- *nnn* = File number (decimal): 3-9999
  Binary, integer and floating point file types will use default file number if file number is absent
- *aaa* = Word Address (decimal): 0-999
- *bb* = (optional) Bit Offset within Word (decimal): 0-15
  Bit Offset is not supported for Floating Point file type

Valid Example: B584:913/13

PLC5-40/60 Alternative Binary Format

Bnnn/bbbbb

- B = Binary File Type
- *nnn* = (optional) File number (decimal): 3-999
  Default file number is used if number is absent
- *bbbbb* = Bit Offset from start of file (decimal): 0-15999

Valid Example: B27/7248

PLC5-40/60 Timer, Counter, Control, SFC Status, Message, PID, Block Transfer and Token Data Files

FFnnn:eee.MNE[ss]/bb

FF	=	File type: T = Timer C = Counter R = Control SC = SFC Status MG = Message PD = PID Control BT = Block Transfer TD = Token Data
nnn	=	File number (decimal): 3-999 optional for T, C and R file types
eee	=	Element number (decimal): 00-999
MNE	=	Member Mnemonic (see Tables 2D-2L)
ss	=	Submember Only applies to .ADDR and .DATA members of PID structure and .DATA member of MSG structure
bb	=	(optional) Bit number (decimal): 0-15 Only applies to analog word members

Valid Example: MG59:333.DATA[0]/15

SLC 500 I/O Files

F:ss.www/bb

F	=	File type: I = Input O = Output
ss	=	I/O Slot number (decimal): 0-30
www	=	(optional) I/O Word Number Expansion (decimal): 0-255
bb	=	(optional) Bit Offset within Word (decimal): 0-15; only when input slot is 0, 0-23

Valid Example: I:22.254/13

Important: ControlView only reads the I/O configuration of your SLC 500 when the first request for information is made. If the SLC 500's configuration is changed while ControlView is running, ControlView will have to be restarted before the changes are recognized.

Writing to the Output files of a SLC 500 is not recommended. However, if you must do this, be sure the SLC is not in RUN mode. The write will fail and an error message will be displayed if the SLC 500 is in RUN mode when you try to write to its Output section.

SLC 500 Status Files

S:aa/bb

- S = Status file type
- aa = Word Address (decimal):
  SLC 500, SLC 5/01 —0-15
  SLC 5/02—0-32
- bb = (optional) Bit Offset within Word (decimal):
  0-15

Valid Example: S:15/6

SLC 500 Binary and Integer Files

Fnnn:aaa/bb

- F = File type: B = Binary
  N = Integer
- nnn = (optional) File number (decimal):
  Binary: 3, 9-255
  Integer: 7, 9-255
  Binary and Integer file types will use default file number if number is absent
- aaa = Word address (decimal): 0-255
- bb = (optional) Bit Offset within Word (decimal):
  0-15

Valid Example: N17:129/2

SLC 500 Alternative Binary Format

Bnnn/bbbb

- B = Binary file type
- nnn = (optional) File number (decimal): 3, 9-255
  default file number used if number is absent
- bbbb = Bit Offset from start of file (decimal): 0-4095

Valid Example: B3/3999

SLC 500 Timer, Counter and Control Files

Fnnn:eee.MNE/bb

F = File type: T = Timer
C = Counter
R = Control

nnn = (optional) File number (decimal):
Timer: 4, 9-255
Counter: 5, 9-255
Control: 6, 9-255

eee = Element number (decimal): 00-255

MNE = Member Mnemonic: (see Tables 2D-2F)

bb = (optional) Bit number (decimal): 0-15
Applies to analog members only

Valid Example: R167:123.EN

SLC 500 Timer, Counter and Control Files Alternative Bit Member Addressing Format

Fnnn:eee/MNE

F = File Type: T = Timer
C = Counter
R = Control

nnn = (optional) File number (decimal):
Timer: 4, 9-255
Counter: 5, 9-255
Control: 6, 9-255

eee = Element number (decimal): 00-255

MNE = Bit Member Mnemonic: (see Tables 2D-2F)

Valid Example: C77:99/OV

SLC 500 Timer, Counter and Control Files Alternative Format – Bit Member Addressing By Bit Address

Fnnn:eee/bb

F = File Type: T = Timer
C = Counter
R = Control

nnn = (optional) File number (decimal):
Timer: 4, 9-255
Counter: 5, 9-255
Control: 6, 9-255

eee = Element number (decimal): 00-255

bb = Bit number (decimal): Timer: 13-15
Counter: 10-15
Control: 8-11, 13, 15

Valid Example: T87:133/14

SLC 500 Timer, Counter and Control Files
Alternative Analog Member Addressing Format

Fnnn:eee.o/bb

F = File Type: T = Timer
C = Counter
R = Control

nnn = (optional) File number (decimal):
Timer: 4, 9-255
Counter: 5, 9-255
Control: 6, 9-255

eee = Element number (decimal): 00-255

o = Word offset (decimal): 1–2

bb = (optional) Bit number (decimal): 0-15

Valid Example: R44:72.1/14

Table 2.D
Timer Mnemonics

Mnemonic	Instruction	Type
EN	Enable	Digital
TT	Timing	Digital
DN	Done	Digital
PRE	Preset Value	Analog
ACC	Accumulator Value	Analog

Table 2.E
Counter Mnemonics

Mnemonic	Instruction	Type
CU	Count Up Enable	Digital
CD	Count Down Enable	Digital
DN	Done	Digital
OV	Overflow	Digital
UN	Underflow	Digital
PRE	Preset Value	Analog
ACC	Accumulated Value	Analog
For SLC 500 only		
UA	Update Accumulator Value	Analog

Table 2.F
Control Block Mnemonics

Mnemonic	Instruction	Type
EN	Enable	Digital
DN	Done	Digital
ER	Error	Digital
UL	Unload	Digital
IN	Inhibit	Digital
FD	Found	Digital
LEN	Length	Analog
POS	Position	Analog
The following control mnemonics apply to all PLC controllers except SLC 500		
EM	Empty	Digital
EU	Enable Unloading	Digital

Table 2.G
PID Mnemonics (PLC-5/250, PLC-5/40/60)

Mnemonic	Instruction	Type	Submember range
EN	Enable	Digital	
CT	Cascaded Type	Digital	
CL	Cascaded Loop	Digital	
PVT	PV Tracking	Digital	
DO	Derivative Of	Digital	
SWM	Software A/M Mode	Digital	
CA	Control Action	Digital	
MO	Mode	Digital	
PE	PID Equation	Digital	
INI	PID Initialized	Digital	
SPOR	SP Out of Range	Digital	
OLL	Output Limit Low	Digital	
OLH	Output Limit High	Digital	
EWD	Error Within Deadband	Digital	
DVNA	Deviation High Alarm	Digital	
DVPA	Deviation Low Alarm	Digital	
PVLA	PV Low Alarm	Digital	
PVHA	PV High Alarm	Digital	
SP	Setpoint	Analog	
KP	Proportional Gain	Analog	
KI	Integral Gain	Analog	
KD	Derivative Time	Analog	

Mnemonic	Instruction	Type	Submember range
BIAS	Output Bias %	Analog	
MAXS	Setpoint Maximum	Analog	
MINS	Setpoint Minimum	Analog	
DB	Deadband	Analog	
SO	Set Output %	Analog	
MAXO	Output Limit High %	Analog	
MINO	Output Limit Low %	Analog	
UPD	Update Time	Analog	
PV	Process Variable	Analog	
ERR	Analog	Analog	
OUT	Output	Analog	
PVH	PV Alarm High	Analog	
PVL	PV Alarm Low	Analog	
DVP	Deviation Alarm +	Analog	
DVN	Deviation Alarm –	Analog	
PVDB	PV Alarm Deadband	Analog	
DVDB	Deviation Alarm Deadband	Analog	
MAXI	Input range Maximum	Analog	
MINI	Input Range Minimum	Analog	
TIE	Tieback %	Analog	
ADDR[]	Address of Master Loop %	Analog	0 — 3
DATA[]	Reserved / Interim Use	Analog	0 — 13

Table 2.H
Message/Message Control Mnemonics (PLC-5/250, PLC-5/40/60)

Mnemonic	Instruction	Type	Submember Range
EN	Enable	Digital	
ST	Start Transmission	Digital	
AD	Done	Digital	
AE	Error	Digital	
CO	Continuous	Digital	
EW	Enable Waiting	Digital	
DN	Synchronization Done	Digital	
ER	Synchronization Error	Digital	
ERR	Error Code	Analog	
RLEN	Request Length	Analog	
DLEN	Done Length	Analog	
DATA[]	Reserved / Internal Use	Analog	0—51
NR	No Response	Digital	
TO	Time Out	Digital	

Table 2.I
Block Transfer Control Mnemonics (PLC-5/250)

Mnemonic	Instruction	Type
AD	Asynchronous Done	Digital
AE	Asynchronous Error	Digital
CO	Continue	Digital
DLEN	Done Length	Analog
DN	Done	Digital
EC	Error Code	Analog
EN	Enable	Digital
ER	Error	Digital
EW	Enable Waiting	Digital
FILE	File Number	Analog
IDX	File Index	Analog
PLEN	Program Length	Analog
ST	Start	Digital
TOUT	Time Out	Analog

Table 2.J
Block Transfer Mnemonics (PLC-5/11, PLC-5/20, PLC-5/30, PLC-5/40, PLC-5/60)

Mnemonic	Instruction	Type
EN	Enable	Digital
ST	Start	Digital
DN	Done	Digital
ER	Error	Digital
CO	Continue	Digital
EW	Enable Waiting	Digital
NR	No Response	Digital
TO	Time Out	Digital
RW	Read Writes	Digital
RLEN	Requested Length	Analog
DLEN	Done Length	Analog
FILE	File Number	Analog
ELEM	Element Number	Analog
RGS	Rack Group Slot	Analog

Table 2.K
Token Data Mnemonics (PLC-5/11, PLC-5/20, PLC-5/30, PLC-5/40, PLC-5/60)

Mnemonic	Instruction	Type
HI	High	Analog
LO	Low	Analog

Table 2.L
SFC Status Mnemonics (PLC-5/11, PLC-5/20, PLC-5/30, PLC-5/40, PLC-5/60)

Mnemonic	Instruction	Type
SA	Scan Active	Digital
FS	Forced Scan	Digital
LS	Last Scan	Digital
OV	Timer Overflow	Digital
ER	Step Errored	Digital
DN	Done	Digital
PRE	Preset	Analog
TIM	Active Time	Analog

Structure Tags: Base and Offset Addressing

When defining a structure tag in the database, you must identify a base address that points to the beginning of the structure, and then identify each member in that structure by specifying its offset from that base address. ControlView calculates the final PLC address by adding the base and offset together.

The base address follows the addressing conventions used by a conventional tag, except that no bit offset or mnemonic can be included in the address.

The offset contains file, element, bit or mnemonic components of an address. The syntax for an offset is:

`[file:]base[/bit]` *or*

`[file:]base.mnemonic[/bit]`

Because offsets do not contain file-type information, the resultant address is assumed to be of the same file type as the base address.

Example: Valid Base & Offset Addresses for Different PLCs

Table 2.M
Sample Base and Offset Addresses

Address Type	Base Address	Offset	Actual Address
PLC-2	100	3/2	103/2
PLC-3	B3:3	10:3/3	B13:6/3
PLC-5	N7:0	2	N7:2
PLC-5	B3:3	3/3	B3:6/3
PLC-5	C5:0	2:0.ACC	C7:0.ACC
PLC-5	T4:0	3.PRE	T4:3.PRE
PLC-5	T4:0	3:3.DN	T7:3.DN
PLC-5/250	1PD3:2	2:4.DATA[2]	1PD5:6.DATA[2]
None	anything	anything	n/a

String Tags: Starting Address and Length

When defining a string tag in the database, you must identify a starting address that points to the beginning of the string, and a length (in bytes) for the string.

The starting address follows the addressing conventions used by a structured tag base address; no bit offset or mnemonic can be included in the address.

The maximum length of a string allowed in ControlView's database is 82 bytes. The maximum length of an actual string tag is dependent on the **PLC type**, (specified in the *Address Type* field of the Configure String Tag window), and the **section** of that PLC controller that you are addressing.

The string length, that is, the value you enter in the *Length* field of the Configure String Tag window, must be a multiple of the element size for the section you specify (see Table 2.N), and be no greater than 82 bytes. For example, the maximum length of a string addressed to section F (or H) of a PLC-3 is 20 elements (20x4 bytes per element = 80, as close to 82 as possible). ControlView will reject incorrect tag lengths.

Important: Different sections of various PLC controllers use varying numbers of bytes to create a string element (see Table 2.N).

Table 2.N
PLC Sections and Elements

Address (PLC) Type	PLC Section	Element Size (in bytes)
PLC-2	n/a	2
PLC-3	A, I, O, N, D, B, S	2
	F, H	4
PLC-5	A	1
	I, O, N, D, B, S	2
	F	4
PLC-5/250	ST (see note, below)	1
	I, O, N, B, S, SD, BTD, IS	2
	F, L	4
PLC-5/11, PLC-5/20, PLC-5/30, PLC-5/40, PLC-5/60	A, ST (see note, below)	1
	I, O, N, D, B, S	2
	F	4
SLC 500	I, O, N, B, S	2

Important: Elements in a string may be letters, numbers, characters, punctuation marks, spaces or special hexadecimal escape codes in the form \XX, where XX is a two-digit hexadecimal number. (Unprintable codes will be displayed as asterisks (**). These escape codes allow you to embed non-ASCII data within a string tag.

Important: No matter what string length is defined, a string written to the String section will be 82 bytes long. The defined string will be written, and ControlView will recognize its length as the length that you defined, but within the PLC controller's string section, 82 bytes will be written, and any previous contents of the 82 byte section will be lost. See examples of the SET command and string tags in the *ControlView Core User Manual*, Chapter 3, *The Actions Menu*.

Unsolicited Messages

ControlView can process unsolicited read and write requests from remote stations (a remote station being either a PLC controller or any other computer attached to the same data highway). For these unsolicited messages to work, you must set up a local point in the CVD to simulate a PLC-2 or PLC-3 data table location. The remote station then sends the message to this address as if it were a PLC controller instead of a ControlView station. These unsolicited messages read or write values to or from the CVD.

Using unsolicited messages can reduce highway traffic by eliminating the need for ControlView to poll the other station. For example, instead of using the Event Detector to check the status of a point in a PLC controller, have the PLC controller signal ControlView when the point changes. Using unsolicited messages also allows remote stations to read the result of a Derived Tag, for example.

Setting Up a Local Tag for Remote Access

An ordinary local tag leaves blank the *Address*, *Node name*, and *Scan Class* fields, and specifies None for the *Address Type*. Local tags intended to receive unsolicited messages are a little different.

ControlView cannot handle an unsolicited message in the form of a bit write request, so digital tags cannot be used to receive unsolicited messages.

For local analog tags to work with unsolicited reads or writes, the local tag must specify:

- either PLC-2 or PLC-3 in the *Address Type* field
- a PLC controller address in the *Address* field. Valid addresses are:

- all PLC-2 addresses
- all PLC controller-3 addresses not in the T, C, H, and F sections

The *Node name* and *Scan Class* fields must remain empty.

For analog tags, the *Data Type* field determines the format of the data written or read from the CVD. When you specify Default data type, the data type associated with the PLC address is used:

- BCD for PLC-2 addresses
- signed integer for PLC-3 N section addresses
- unsigned binary for all other PLC-3 addresses

As with all values in the CVD, the value will be adjusted using the *Scale* and *Offset* values before it is read from or written to the CVD.

If a remote station tries to read a value from the CVD, and the value is outside the range specified by the *Minimum* and *Maximum* fields, ControlView returns an error to the remote station. However, the *Minimum* and *Maximum* fields play no part when a remote station tries to write a value to a local tag.

String tags have the following characteristics when used with unsolicited messages:

- String tags do not require a Data Type
- Unsolicited string messages are only supported for strings defined as PLC-3 ASCII section (not for PLC-2s)
- Unsolicited string reads and writes will only work if the remote request size is equal to or less than the value configured as the length of the string. If the string is longer than the configured length, an error message will be displayed

Using Unsolicited Messages

ControlView is capable of handling an unsolicited analog message, so long as the request is:

- for a PLC-2 or PLC-3 address
- for a single element (i.e., not a block request)
- to a 16 bit word address (i.e., all PLC-2 addresses and all PLC-3 addresses not in the T, C, H, and F sections)
- not a bit write request

ControlView can also handle unsolicited string messages as long as the request is for a PLC-3 ASCII section.

How to Receive Unsolicited Messages

A database must be loaded before a remote station can send an unsolicited message. If the database is not loaded, or if the local tag is not defined when ControlView receives an unsolicited message, ControlView will generate an error message.

How to Send Unsolicited Messages

To send an unsolicited message:

- from a PLC-5, use the MSG ladder logic instruction
- from a remote ControlView station, use the STATUS, SET, or RAMP commands
- from a PLC-2, PLC-3 or any device capable of sending messages, use the appropriate message command (CMD) and function (FNC) codes

Generating Requests from a PLC-5

Use the PLC-5 message (MSG) instruction to generate ControlView requests from a remote PLC-5 station (refer to the *PLC-5 Family Programmable Controller Processor Manual*, Publication 1785-6.8.2 for instruction details). Table 2.O shows the instruction's parameters.

Table 2.O
PLC-5 MSG Instruction Parameters

Parameter	Restrictions
Read/Write:	Both read and write are allowed.
PLC-5 data table address:	Only 16-bit word addresses allowed.
Size in elements:	Must be 1 for analog tags. For string tags, must be <= configured Length
Local/Remote:	Both local and remote networks allowed.
Remote Station:	Any valid station.*
Link ID:	Any valid link. *
Remote Link Type:	Data Highway II only.*
Local Node Address:	Any valid station.**
Processor Type:	Only PLC-2 or PLC-3 allowed.
Destination Data Table Address:	PLC Address of ControlView local tag.

* If the Local/Remote parameter is set to Remote, these parameters are the settings of ControlView's communication module.

** If the Local/Remote parameter is set to Remote, this parameter is the address of the 1785 KA bridge; if Local, this parameter is the address of ControlView's communication module.

Generating Requests from a Remote ControlView

One ControlView station can issue the STATUS, SET, or RAMP commands to access information on a remote ControlView station. (These commands are explained in the *ControlView Core User's Manual.*) To do this, the first ControlView must have an entry in the Node Table defining the station address of the remote ControlView's communication module. This entry will also specify PLC-2 or PLC-3 as the Node Type, depending on what Address Type was specified in the remote ControlView's CVD.

Example: Two ControlViews

One ControlView station, CV1, has a database with a local tag defined with a PLC-3 address type and an address of N1:1. A second ControlView station, CV2, wants to change the value of the local tag at CV1. To do this:

- CV2 would need to define a node (nodename CV–NODE, for example) for CV1. This node definition would specify CV1's local tag address and the node type as PLC-3.
- CV1 would have to have the database loaded.
- CV2 could then use this command to change the tag's value to 2:
  ```
  SET $CV-NODE::N1:1 2
  ```
- CV2 could also send a text string:
  ```
  SET $CV-NODE::A0:0 "HELLO"
  ```

Generating Requests from a Remote PLC Controller or Computer

Refer to A-B Data Highway protocol documentation for the format of the Data Highway message packets. ControlView will process the following message command (CMD) and function (FNC) codes as defined by A-B:

Table 2.P
Command and Function Codes

Command	Command Code (CMD)	Function Code (FNC)
PLC-2 unprotected read	01	n/a
PLC-2 unprotected write	08	n/a
PLC-3 word range read	0F	01
PLC-3 word range write	0F	00

ControlView returns the following status and extended status codes to the remote station in the reply message:

Table 2.Q
Status and Extended Status Codes

Condition	Status Code	Extended Status
Success	0	n/a
PLC-3 invalid logical address	F0	04
PLC-3 address not supported or address not defined	F0	06
PLC-3 multiple element request	10	n/a
PLC-3 data out of min max range	F0	06
PLC-2 address not defined	50	n/a
PLC-2 multiple element request	10	n/a
PLC-2 data out of min max range	50	n/a

Errors Associated with Unsolicited Messages

ControlView will display the following error messages when errant unsolicited messages are received:

Table 2.R
Error Messages

Error Message	Meaning
`Unsolicited PLC message received with no loaded database.`	Remote message received with no loaded database.
`Unsolicited PLC message received for an undefined local address.`	There's no local tag for the requested PLC-2 or PLC-3 address.
`Unsolicited PLC message received for more than one data element.`	Request for multiple data elements.
`Unsolicited PLC message received for an unsupported bit write operation.`	Request received for a bit write to a local tag.
`Unsolicited PLC-3 message received for a symbolic address.`	Request does not contain a logical PLC-3 address.
`Unsolicited PLC-3 message received for an unsupported local address.`	Request for PLC-3 section T, C, H, or F address.
`Local value is out of range for an Unsolicited PLC read request.`	The value of the local tag exceeds its minimum or maximum value or exceeds the limits of its destination data type. Minimum, maximum and data type attributes for the tag are defined in the ControlView database.
`The size of the unsolicited PLC read/write request exceeds the configured string tag value length.`	The unsolicited read/write request is longer than the length specified for the string tag in the *Length* field of the Configure String Tag window.

Chapter 3

Using the Drivers

This chapter describes with the ControlView commands and features that relate to the A-B Drivers.

A-B Highway Diagnostics

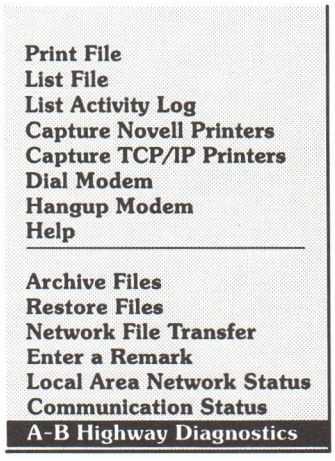
The A-B Highway Diagnostics utility analyses communications on A-B Data Highway(s). Highway Diagnostics sends messages to the Data Highway and reports the data it receives, on the screen and in printed form. You can use this information to identify devices on the highway, and diagnose communication problems.

Use Highway Diagnostics when first setting up a Data Highway to ensure that all devices are communicating properly. Highway Diagnostics can also help with highway maintenance by providing troubleshooting information while the highway is running.

Important: Highway Diagnostics does **not** support the A-B Data Highway II.

Running Highway Diagnostics

You can start up A-B Highway Diagnostics from the Action menu or from the command line.



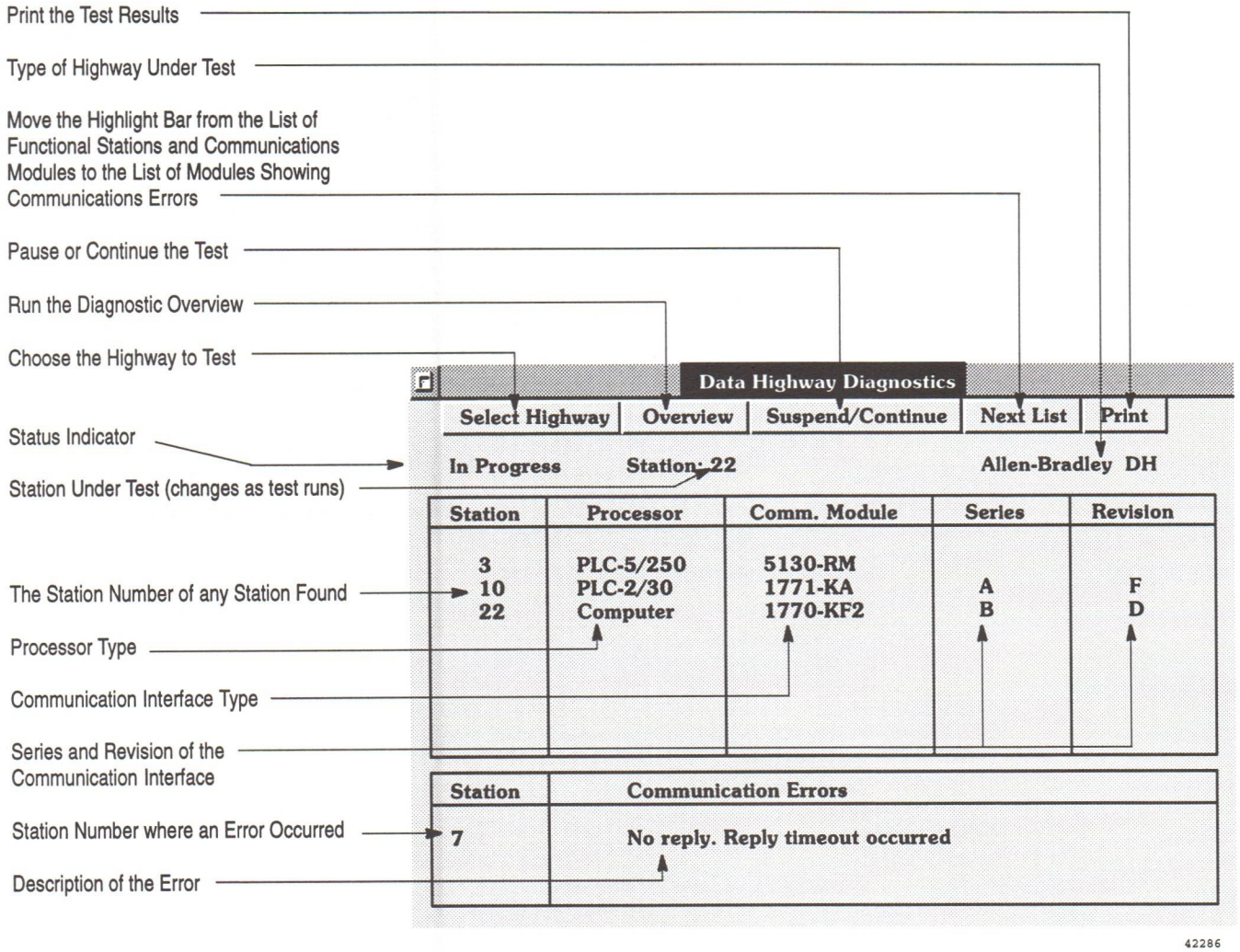
Using the menus, choose *A-B Highway Diagnostics*, under Tools in the Action Menu.

Using the command line, type:

ABDIAG *press* ***Enter***

The Data Highway Diagnostics window will appear.

Figure 3.1
A-B Data Highway Diagnostics Window



Choose a Highway to Test

1. Choose *Select Highway* (at the top left). A window will open naming the default highway (either Highway1 or Highway2, as configured in the Device Configuration window). You can accept the default highway or change the selection.

   To test a different highway, press **Enter** or click on the *Highway* field; then choose *Highway1* or *Highway2* from the list.

2. If the Highway Type setting is incorrect, choose the *Highway Type* field. Choose between DH, DH+, DH485 and Offlink.

   The highway type is shown in the upper right of the screen.

3. Click on the *Accept* button or press + to save the setting. ControlView will refuse a choice that conflicts with the definition in the Data Channel Configuration window.

Run the Diagnostic Overview

4. Choose *Overview* to test the highway you have selected. The overview will start immediately. The status message at the top left corner will show `In Progress`, and the Station display will count up as a diagnostic message is sent to each station number.

   The overview may take several minutes to complete because it sends a diagnostic message to each of the possible station addresses on the highway. The number of possible stations on the highways are:

   - on a Data Highway Plus—64 possible stations, numbered 0-77 octal
   - on a Data Highway—255 possible stations, numbered 0-376 octal
   - on a DH-485—32 possible stations, numbered 0-31 decimal
   - on an Offlink Data Highway Plus—64 possible stations, numbered 0-77 octal

5. Choose *Suspend/Continue* to stop or restart the test temporarily. When the test is suspended, `Suspended` is displayed in the Status Indicator, in place of `In Progress` at the top left.

6. Cancel the test by pressing **Esc**—after a few moments the test will stop and the Status Indicator will display `Aborted`. If a message is pending when the test is canceled, the message will display `Aborting` until the message is received.

7. To close the diagnostic window, click on the gray button in the top-left corner (or press **Esc**).

Analyzing the Test Results

The window is divided into two sections. As stations respond, the two sections fill up with lists—the top list shows stations which respond as expected, while the bottom list shows stations which exhibit problems. The nature of any problem is listed in the Communication Errors column. The communication errors will appear in red in the Communication Status display (see Figure 3.2).

At any time during or after the test, you can use the up and down arrows to scroll through the lists of station information. To move the highlight cursor from one list to another, click on the list or choose *Next List* from the menu.

The top list identifies:

- the station numbers (in octal)
- the processor type found at that station (the `Computer` processor type may be a ControlView node or any other non-PLC computer)
- the communication module which connects the processor to the highway
- the series and revision codes for the communication module

The lower list identifies:

- the station number where a problem was encountered
- the type of problem

Some of the common error messages are listed in Table 3.A. In general, when a problem is encountered, you should check:

- cabling (cable length, connectors, etc)
- power connections
- baud rate settings for all devices
- highway configuration

Table 3.A
Common Error Messages

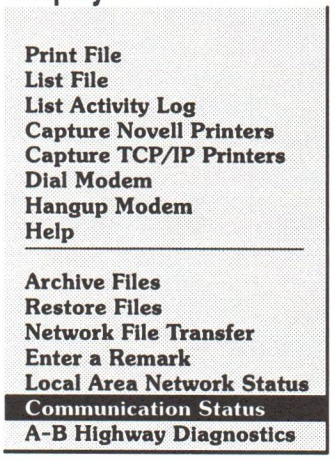
Message	Problem	Possible Solution
No reply. Reply timeout occurred	The station is not responding	Turn the station's power off and on
Maximum number of retries attempted with no response	The station is not responding	Turn the station's power off and on
Message framing error (noisy link)	There is a problem with the cabling	Check the cable length, connectors, etc.
Remote station does not ACK command message	The station is not responding	Turn the station's power off and on
Duplicate token holder detected	There is noise on the highway, or two stations have the same address	Check the cabling and station addresses
Remote station host disconnected or shut down	Remote station host disconnected or shut down	Reconnect or cycle power to the remote station host

Important: Communication errors are generated for each station number that doesn't exist on the highway. If your activity log is configured to log communication errors, this can quickly fill up the activity log. You may want to turn off logging for communication errors while you run the diagnostics, and turn it on again when you're done.

Printing the Test Results

Choose *Print* to print the contents of both lists. Before printing, you have to select which printer to print on.

The Communication Status Display



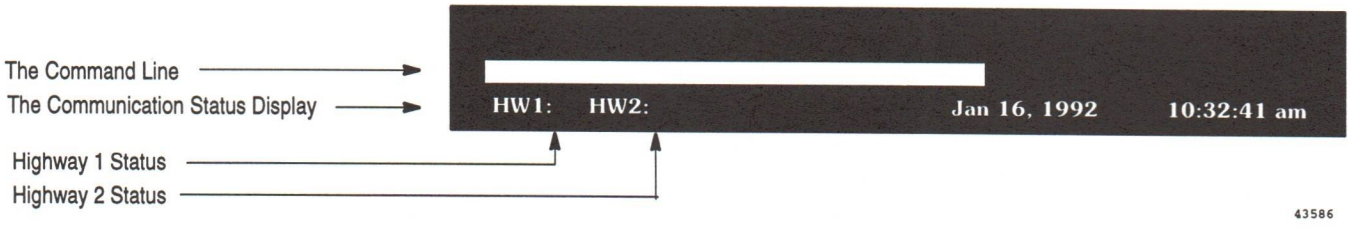
Choose *Communications Status* under Tools in the Actions menu to bring up the Communications Status display. A list of three choices will appear:

Choose `station`; this configures the Communication Status display to show the station number of the programmable controller that ControlView is currently communicating with; under normal conditions, a green display will continuously update with current information.

If you choose `messages`, the Communication Status display will show the number of buffered message waiting to be transmitted. This figure is a proportional indication of the communications load on the network, and therefore of the data update performance.

The Communication Status display will appear at the bottom of the screen.

Figure 3.2
The Communication Status Display



If a communication error occurs, the display will change to reverse-video red. When the error has cleared, the display will change to yellow to indicate that an error had occurred. (These are default colors and can be configured in the COMSTATUS Display Configuration window. Choose *Set Up COMSTATUS Display* under Tools in the Setup Menu.)

Choose `reset` to acknowledge the error and restore the indicators for both channels to green after an error has been detected. If you are working in an operator's screen, a Mouse GRAFIX display, for example, you can reset the indicators more readily by calling up the command line (press **Alt-C**) and entering the command:

`COMSTATUS RESET` *press* ***Enter***

You can use the COMSTATUS command to control the Communications Status display. Refer to Appendix A, *ControlView Commands* in the *ControlView Core User Manual* for more detail.

The display format for the COMSTATUS window is:

`HW1:`*`nnn`* `HW2:`*`nnn`*

`HW1` indicates HIGHWAY1 (as defined in the Device Configuration window) information

`HW2` indicates HIGHWAY2 information (if defined).

`nnn` is the actual information, either the current station number, or the number of buffered message transactions.

Logging Communication Activity

You can choose to log all tag reads, tag writes, and communication activity (including communication errors) to a printer or disk file.

To log all communications activity, make sure to specify that you want Communications, Tag Writes, and Tag Reads when configuring the activity log. See Chapter 3, *The Setup Menu*, in the *ControlView Core User Manual* for complete details.

Appendix A

Commands

ABDIAG

ABDIAG

Loads the A–B Drivers Diagnostic software and opens the Data Highway Diagnostics window.

There are no parameters for this command.

Appendix B

Cabling Diagrams

This appendix contains cabling diagrams for:

- connecting ControlView to a Data Highway or Data Highway Plus using the following serial ports:
  - 6121-AAS
  - 6121-CBB
  - 6171-MX5/8

  and communicating via the following devices:
  - 1770-KF2
  - 1771-KE/KF
  - 1771-KG
  - 1775-KA
- connecting ControlView to a DH-485 network through a 1770-KF3
- connecting a modem to a 1770-KF3

For cabling information on the 6171-IDH card, refer to the IDH user's manual.

Cabling for the Data Highway and Data Highway Plus

Use the following connections to construct cables connecting the Data Highway and Data Highway Plus to the serial ports of your computer.

Important: The standard IBM® 9-pin serial port and the A-B 6121-AAS serial port are functionally identical.

Figure B.1
6121-AAS to 1770-KF2

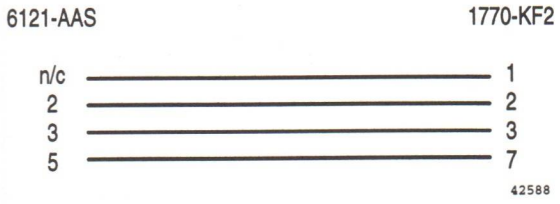


Figure B.2
6121-AAS to 1771-KE, KF, KG

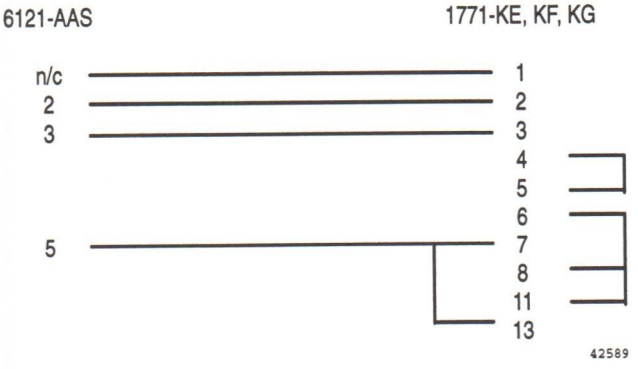


Figure B.3
6121-AAS to 1775-KA

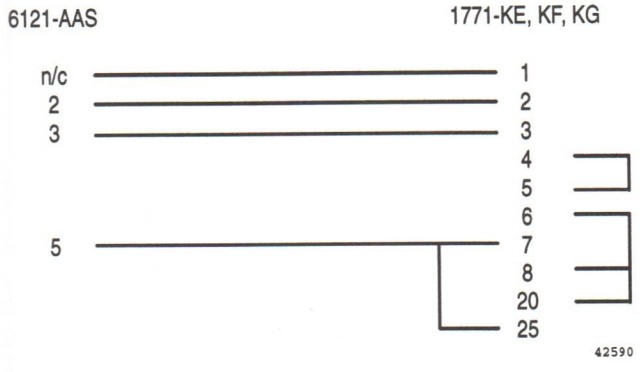


Figure B.4
6121-CBB to 1770-KF2

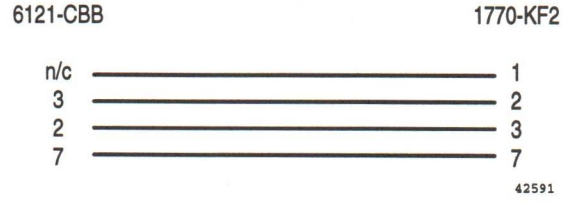


Figure B.5
6121-CBB to 1771-KE, KF, KG

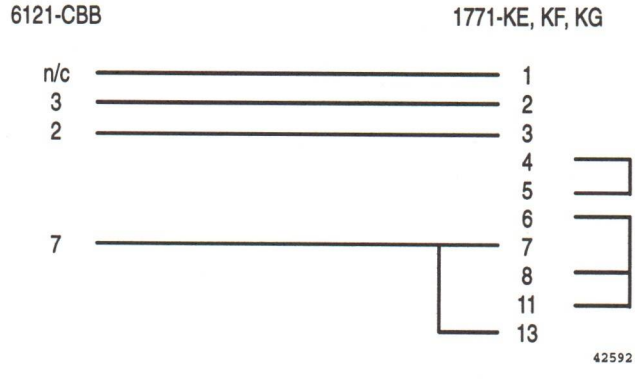


Figure B.6
6121-CBB to 1775-KA

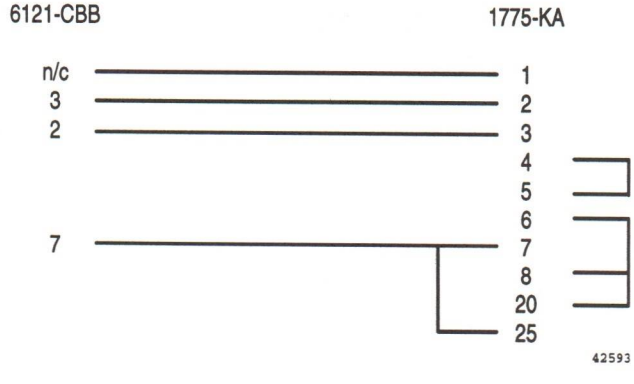


Figure B.7
6171-MX5/8 to 1770-KF2

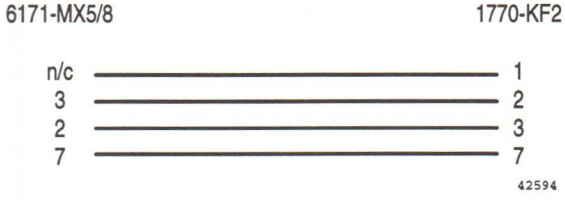


Figure B.8
6171-MX5/8 to 1771-KE, KF, KG

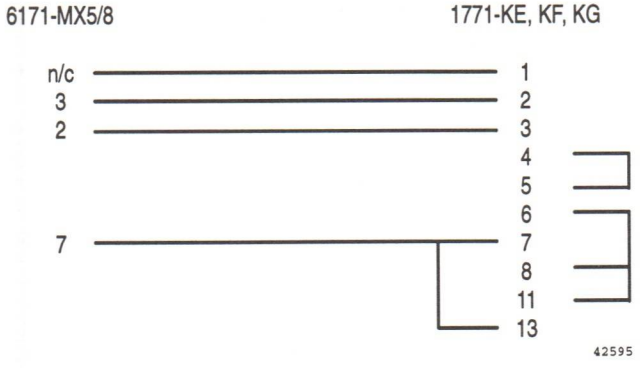
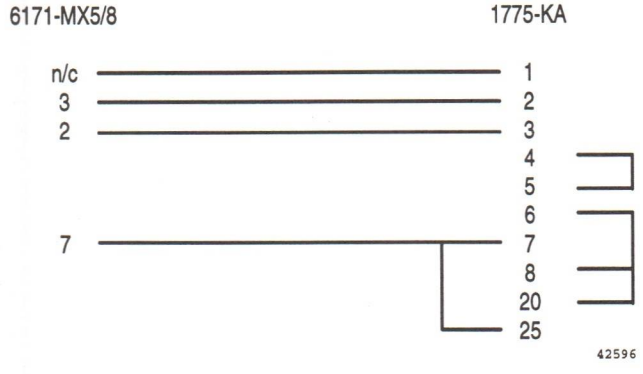


Figure B.9
6171-MX5/8 to 1775-KA



Cabling for the DH-485 via a 1770-KF3

Use the following cable connections to construct a cable connecting your computer or modem to the 1770-KF3.

Connecting the KF3 to a Computer

Use Belden #8723 (or equivalent) cable to construct a cable to connect the KF3 to a computer. The length must not exceed 50 feet, and the cable shield must be connected to Pin 1 at the KF3 end only.

There are various cabling options depending on whether or not your application makes use of handshake signals, whether or not you are connecting to a 9 pin serial port for an IBM AT®, and whether or not your computer uses standard IBM pinouts. The following diagrams are for IBM computers with either 9 or 25 pin ports. If your computer has a different pinout, construct a cable using the appropriate signal names for your computer.

If you are not using the handshake signals, use one of the three wire connections shown in Figure B.10 and Figure B.11.

Figure B.10
Three Wire Connection to IBM Computer (25 pin)

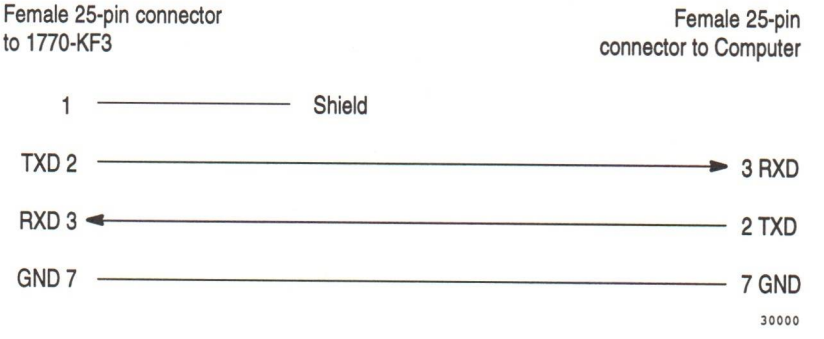
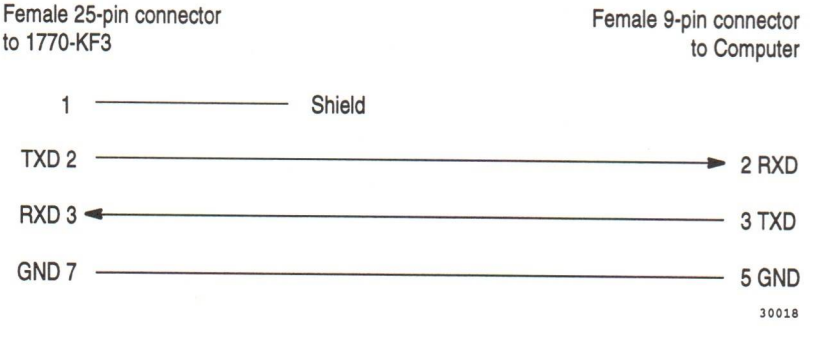


Figure B.11
Three Wire Connection to IBM Computer (9 pin)

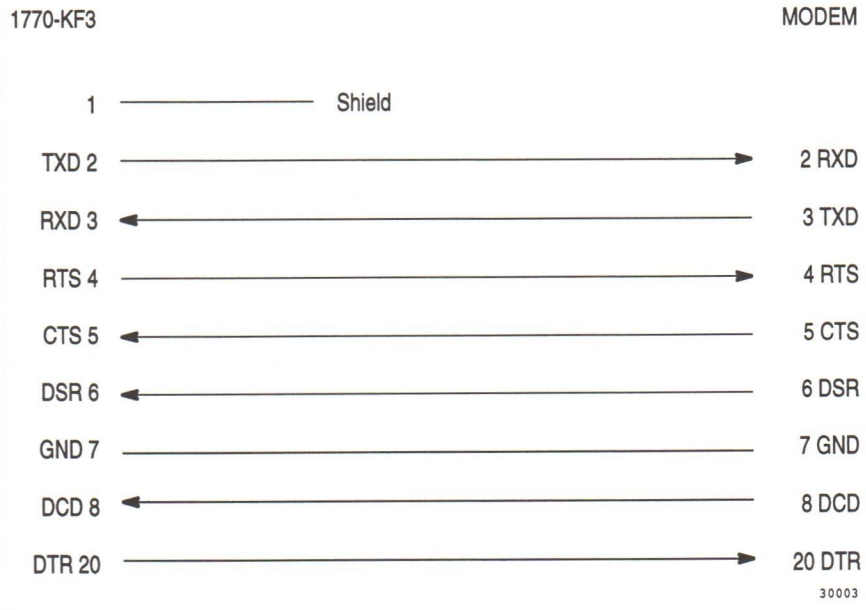


Connecting the KF3 to a Modem

The KF3 is connected to a modem via a direct 25 pin-to-25 pin cable, which you must construct using Belden #8723 (or equivalent) cable. The length of the cable must not exceed 50 feet, and the cable shield must be connected to Pin 1 at the KF3 end only.

Figure B.12 shows the connection between a KF3 and a modem.

Figure B.12
Connection to a Modem



Numbers

A

B

C

D

W

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